Name:

at1118paper: Complete the Square (v402)

Example

By completing the square, find both solutions to the given equation:

$$x^2 - 32x = -240$$

Add $\left(\frac{-32}{2}\right)^2$, which equals 256, to both sides of the equation.

$$x^2 - 32x + 256 = 16$$

Factor the left side.

$$(x - 16)^2 = 16$$

Undo the squaring. We need to consider both $\pm\sqrt{16}$.

$$x - 16 = -4 \quad \text{or} \quad x - 16 = 4$$
$$x = -20 \quad \text{or} \quad x = -12$$

Question 1

By completing the square, find both solutions to the given equation:

$$x^2 + 18x = -56$$

$$x^2 + 18x + 81 = 25$$
$$(x + 9)^2 = 25$$
$$x + 9 = \pm 5$$
$$x = -14 \quad \text{or} \quad x = -4$$

Question 2

By completing the square, find both solutions to the given equation:

$$x^2 - 52x = -667$$

$$x^2 - 52x + 676 = 9$$
$$(x - 26)^2 = 9$$
$$x - 26 = \pm 3$$
$$x = 23 \quad \text{or} \quad x = 29$$

Question 3

By completing the square, find both solutions to the given equation:

$$x^2 - 12x = -35$$

$$x^2 - 12x + 36 = 1$$
$$(x-6)^2 = 1$$
$$x - 6 = \pm 1$$
$$x = 5 \quad \text{or} \quad x = 7$$

Question 4

By completing the square, find both solutions to the given equation:

$$x^2 + 40x = -375$$

$$x^2 + 40x + 400 = 25$$
$$(x+20)^2 = 25$$
$$x + 20 = \pm 5$$
$$x = -25 \quad \text{or} \quad x = -15$$

Question 5

By completing the square, find both solutions to the given equation:

$$x^2 - 42x = 2160$$

$$x^2 - 42x + 441 = 2601$$
$$(x-21)^2 = 2601$$
$$x - 21 = \pm 51$$
$$x = -30 \quad \text{or} \quad x = 72$$

Question 6

By completing the square, find both solutions to the given equation:

$$x^2 + 24x = -119$$

$$x^2 + 24x + 144 = 25$$
$$(x+12)^2 = 25$$
$$x + 12 = \pm 5$$
$$x = -17 \quad \text{or} \quad x = -7$$